

*Sub D4
Amend*

irradiating an intense light to said insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.

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34. (Amended) A method for manufacturing a semiconductor device comprising the steps of:

forming a crystalline semiconductor film over a substrate;

forming an insulating film comprising silicon oxide on said crystalline semiconductor film by a vapor phase deposition using TEOS; and

irradiating an intense light to said insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.

REMARKS

The Office Action of **March 20, 2001**, has been received and its contents carefully noted. Filed concurrently herewith is a *Request for a Two (2) Months Extension of Time* which extends the shortened statutory period for response to **August 20, 2001**. Accordingly, Applicant respectfully submits that this response is timely filed.

Claims 1-37 were pending in the present application prior to the aforementioned amendment, with claims 15-28 having been withdrawn from consideration as drawn to a non-elected invention. Due to the above Amendment, claims 1, 6, 11, 30, and 34 have been amended to clearly recite subject matter which Applicant is entitled. Because the amended claim language is supported at least on page 26, lines 6 and 7 of the specification, Applicant submits that no issue of new matter is raised by this Amendment. Accordingly, claims 1-37 are still pending in the present application and, at least for the reasons set forth below, are believed to be in condition for allowance.

The Office Action rejects claims 1-4, 6-9 and 30-33 under 35 U.S.C. §103(a) as unpatentable over *Applicant's Admitted Prior Art* (hereinafter "*APA*") in view of either

Ang et al. ("Electrical characterization of low-pressure chemical-vapor-deposited silicon dioxide metal-oxide-silicon structures" Journal of Applied Physics 73(5) pp. 2397-2401, 1 March 1993), claims 1-4, 6-9, 11-13, 29, 30-33 and 34-37 under 35 U.S.C. §103(a) as unpatentable over *APA* in view of *Roy* (U.S. Patent No. 5,153,701) and *Wolf* (Silicon Processing for the VLSI Era, Vol. 1, Lattice Press: Sunset Beach, CA, 1986, pp. 57-58), or *JP 58-098933*, and claims 5 and 10 under 35 U.S.C. §103(a) as unpatentable over *APA* in view of either *Ang et al.* and *JP 60-187030*, or *Roy*, *Wolf* and *JP 60-187030*, or *Roy*, *JP-58-098933* and *JP 60-187030*. By the above Amendment, Applicant has amended claims 1, 6, 11, 30 and 34 to recite subject matter which is patentably distinct over the prior art of record. Reconsideration and withdrawal of the rejection is respectfully solicited.

The claimed invention is directed to a method of manufacturing a semiconductor device comprising the steps of forming a semiconductor film comprising amorphous silicon over a substrate, crystallizing the semiconductor film by irradiating a laser light, forming an insulating film on the crystallized semiconductor film by a vapor phase deposition, and irradiating an intense light to said insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.

As the Examiner well knows, in formulating a rejection under 35 USC §103, a four-level factual inquiry must be conducted. First, determining the scope and content of the prior art. Secondly, ascertaining the differences between the claimed invention and the prior art. Thirdly, resolving the level of ordinary skill in the pertinent art. And last, an evaluation of objective evidence of non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). In essence, to establish a *prima facie* case of obviousness, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA 1974).

Applicant respectfully contends that the claims as presently recited set forth subject matter which is clearly patentably distinct over the prior art of record. More

particularly, Applicant respectfully contends that the *APA*, either alone or in combination with at least one of *Ang et al.*, *JP 60-187030*, *Roy*, *Wolf*, *JP-58-098933* and *JP 60-187030*, fails to expressly teach or inherently suggest all of the limitations presently set forth in the claimed invention necessary to support a *prima facie* case of obviousness under §103. Nor is there any motivation in the prior art of record to do what is set forth in the claimed invention.

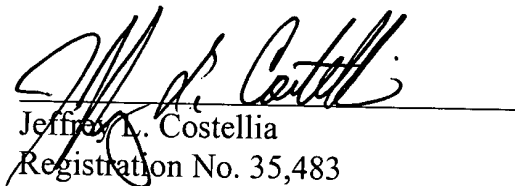
Referring now to the rejection, while the Office Action finds that the proposed *APA* modifications teaches a method of manufacturing a semiconductor device using various method steps, it is contended that the respective disclosures set forth in the proposed *APA* modifications fail to expressly teach or inherently disclose a method of manufacturing a semiconductor device by performing a step of irradiating an intense light to an insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less, as presently set forth at least in independent claims 1, 6, 11, 30 and 34. In addition, there is a lack of motivation in the respective teachings of the proposed *APA* modifications to provide a method of manufacturing a semiconductor device by irradiating an intense light to an insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.

Moreover, there is also a lack of suggestion in the prior art as to why one of ordinary skill in the art would use the proposed *APA* modifications to achieve the unobvious advantages first recognized by the Applicant. In particular, it is respectfully submitted that practice of the claimed method yields advantageous benefits that are not disclosed in the prior art of record, namely, the proposed *APA* modifications. For instance, the step of irradiating an intense light to an insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less is unobviously advantageous since it reduces the number of trap centers caused by hydrocarbons in the insulating film.

On the other hand, since neither of the *APA*, *Ang et al.*, *JP 60-187030*, *Roy*, *Wolf*, *JP-58-098933* and *JP 60-187030* publications expressly teaches or inherently describes a method of manufacturing a semiconductor device by performing a step of irradiating an intense light to an insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less, practice of their combined teachings would not yield the benefits presently set forth in the claimed invention.

Accordingly, since neither of the proposed *APA* modifications expressly teaches or implicitly suggests the disclosed features of the present invention, and also fail to recognize the unobvious advantages first proposed by Applicant, Applicant respectfully requests favorable reconsideration and withdrawal of the §103 rejections. Should the Examiner deem that a conference would expedite prosecution of the instant application, the Examiner is hereby invited to telephone the undersigned to arrange such a conference.

Respectfully submitted,



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Marked-up copy of amended claims.

1. (Twice Amended) A method for manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising amorphous silicon over a substrate;
crystallizing said semiconductor film by irradiating a laser light;
forming an insulating film on the crystallized semiconductor film by a vapor phase deposition; and

irradiating an intense light to said insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.

6. (Twice Amended) A method for manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising amorphous silicon over a substrate;
crystallizing said semiconductor film by irradiating a laser light;
forming an insulating film comprising silicon oxide on the crystallized semiconductor film by a vapor phase deposition; and

irradiating an intense light to said insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.

11. (Twice Amended) A method for manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising amorphous silicon over a substrate;
crystallizing said semiconductor film by irradiating a laser light;
forming an insulating film comprising silicon oxide on the crystallized semiconductor film by a vapor phase deposition using TEOS; and

irradiating an intense light to said insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.

30. (Amended) A method for manufacturing a semiconductor device comprising the steps of:

forming a crystalline semiconductor film over a substrate;

forming an insulating film comprising silicon oxide on said crystalline semiconductor film by a vapor phase deposition; and

irradiating an intense light to said insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.

34. (Amended) A method for manufacturing a semiconductor device comprising the steps of:

forming a crystalline semiconductor film over a substrate;

forming an insulating film comprising silicon oxide on said crystalline semiconductor film by a vapor phase deposition using TEOS; and

irradiating an intense light to said insulating film in an atmosphere comprising an oxygen gas under a pressure of 10 Torr or less.